



L. 9. 27

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OF

ACONITUM NAPELLUS.

BY

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(Reprinted from THE LANCET of March the 29th, 1856.)

LONDON:

PRINTED BY EDWARD THOMAS, 423, STRAND

ON

POISONING BY THE ROOT OF ACONITUM NAPELLUS.*

THE plant which we call Aconite, or Monkshood, is probably the same as the Aconitum, so interesting to students of classical literature as the poison which, next to conium, was probably in most extensive use amongst the nations of antiquity. Though the description given by the ancient botanist, Theophrastus, is not very distinct, Dioscorides describes several kinds of aconite, in one of which we seem to recognise our A. Napellus, which is still indigenous in the mountains and uplands of Greece:—another is thought to be a species of Delphinium. He states that aconite was used in painful affections of the eye; that by its root scorpions were stupefied and rendered torpid, being again restored by hellebore; also that flesh poisoned with aconite was used as a bait wherewith to kill panthers, wild boars, and wolves.

The invention of Aconite was attributed by the ancients to Hecate,—or it was believed that it sprang from the foam of Cerberus. The uses to which they put it were worthy of its fabled origin. It entered into the poisonous cup which Medea mingled for Theseus, and into the draught by means of which a barbarous law disposed of the old men of Ceos, when infirm, and no longer of use to the state. It was employed in secret

* The author's best excuse for not having treated the subject in a more adequate manner than in this brief paper, is, that it was put together in its present form in order to be read at the weekly meeting of the Medical Society of London, (March 15th.)

poisoning, and Theophrastus states that the practisers of this art understood it so well, that while giving aconite they could at their pleasure prolong the life of their victim for one month, two months, or any fixed term. In the later days of Rome, this aconite poisoning became quite a fashion, as we read in Ovid—

“Imminet exito vir conjugis, illa mariti,
Lurida terribiles miscent aconita novercæ.”

From the catalogue of ancient poisoners, history has singled out for especial infamy the name of Calpurnius Bestia, who was accustomed to dispose of his wives by means of aconite.

In the middle ages, also, the powers of aconite were well understood. Little as we are able to penetrate into the dark records of mediæval crime, there is scarce a doubt but that aconite was well known to the skilful poisoners of Italy, and formed at least one ingredient in the secret draught of the Borgias.

Matthioli states that a criminal was put to death by a drachm of the root. It was given in 1524 to two criminals at Rome; in 1561, to two others at Prague. Out of these four, two died. Dodonæus mentions five persons who ate the root by mistake at Antwerp. They all died. Mordus narrates the case of a man who was deranged by eating some of the leaves of aconite. The physician who was called in declared that the plant was not the cause of the disorder. To prove this, he ate freely of it, and soon after died in great agony.

The history of aconite poisoning in *modern* times presents at least one agreeable feature, when contrasted with what has been recorded of its use amongst the ancients and in the middle ages—namely, that it is generally, if not invariably, *accidental*.

Though I have undertaken to write only of aconite root, it is proper to mention that the leaves of aconite are also highly poisonous, as well as the flowers and the seeds, though these are all less active than the root. The leaves likewise differ from the root in being possessed of more acidity. This property appears to depend on a volatile principle which is not poisonous in its nature.

Willis records the case of a man who was poisoned by eating the shoots of aconite by mistake for celery. In this case mania preceded death. Dr. Turner tells of a number of Frenchmen who mistook the same shoots for masterwort, and nearly all of whom died. In the "Philosophical Transactions" for 1737, is the case of one John Crumpler, who ate aconite leaves in salad; and Haller mentions the death of a Swedish army-surgeon who committed the same fatal error, the more excusable in his case, inasmuch as the leaves of one or two species of aconite are commonly eaten with impunity in the north of Europe. (Especially *A. Lycoctonum*;—*v. Linnaeus*.) Only the last week, as we read in the *Nottingham Journal*, two children who partook of some of the young leaves of *A. Napellus*, were seized with dangerous symptoms, but recovered under the judicious treatment of Mr. Marsh, of Newark.

It would not be difficult to multiply such instances; but as that is not my immediate business, I proceed to notice that more common and more fatal accident, poisoning by the *root* of aconite. Many such instances have occurred in this kingdom during the last few years; and when that most terrible and striking example of these fatal mistakes took place about two months ago at Dingwall, in Scotland, my attention became strongly drawn towards the subject, and I thought that I should perhaps act wisely in bringing the matter before my professional brethren; for I think that if the question be only a little more taken up and canvassed by the members of the medical profession, the public will be placed on their guard, and such calamitous occurrences rendered less likely for the future.

The cases of poisoning by Aconite root may be divided under two heads. I intend to speak most of the second kind.

1. Poisoning by an overdose of some preparation given as medicine. (This is nearly always the tincture, though a case has been put on record by Mr. W. Herapath, in which a table-spoonful of the decoction proved fatal.)

2. Poisoning by root of aconite, taken by mistake as an article of food.

A case of poisoning by tincture of aconite is to be found in the "Philosophical Transactions," vol. xxxviii. Another was narrated by Mr. Sherwen, in 1837. During the last five years, four cases of the kind have occurred, three of which were fatal. In every case the symptoms have been nearly the same. First, tingling of the tongue; then tingling followed by numbness of the face, and of the arms about the same time; feeling as if the face were large; great tightness in the throat; then vomiting; loss of power in the lower extremities; feeble pulse, or stoppage of the heart; laborious breathing; (pupils various?). Before death, sometimes insensibility, sometimes delirium, not unfrequently convulsions.

CASE 1.—Recorded by Dr. Topham, in *THE LANCET*, July, 1851. A woman was taking an eight-ounce mixture; into this half an ounce of tincture of aconite was introduced. Dose, half an ounce,—i.e., fifteen minims of the tincture. Sensation was lost in the face and arms; vomiting followed; she was insensible for two hours. She then gradually recovered.

CASE 2.—Occurred on October 6th, 1852, to Mr. Bolton, excise officer in St. Katharine's Docks, London. A bottle of Fleming's tincture having arrived from Scotland, he, not knowing what it was, tasted it. He probably took about a teaspoonful. In the evening he was found cold and pulseless. He died.

CASE 3.—Happened in Glasgow, January 8th, 1853. Mr. Brown, a merchant, being slightly unwell, received from a pupil in a doctor's shop a dose containing twenty-five minims of tincture of aconite. He had read that this was the dose in some French book. He returned in one hour, with symptoms of palsy in the legs. He died in the evening.

CASE 4.—Formed the subject of a criminal trial in Ireland, in the present month. At Newry, on February 23rd, 1856, Captain Aquila Smith, of the Lancashire Militia, received a mixture in which tincture of aconite had been dispensed by mistake for tincture of chiretta. One dose was taken, containing one drachm of the tincture of aconite. He died in a

few hours, the most striking symptom having been the loss of power in the legs, causing him to fall when he attempted to walk. The two dispensers were convicted of manslaughter, and sentenced each to four months' imprisonment.

We have in these four cases two instances of death having been caused by one drachm of Fleming's tincture, one fatal case from twenty-five minims of the tincture of the London College, and a fourth case in which fifteen minims of the tincture of the London Pharmacopœia proved nearly sufficient to destroy life.

Some degree of occasional carelessness in the dispensers of medicine, highly reprehensible though it be, is, I fear, a danger against which the best educational system we can invent will be insufficient to protect us. As two of these cases were clearly attributable to such carelessness, and fatal accidents with strychnia and other poisonous medicines have occurred from the same cause, it becomes a matter of importance to invent some sufficient safeguard against so great a risk. It seems to me that the very best and simplest that has yet been proposed is the plan which has just been put in practice under the authority of the Dublin College of Physicians, and which might be followed in England with great advantage. It consists in uniformly keeping those drugs and preparations which are comparatively harmless in round or cylindrical bottles, and those which are poisonous in square or angular bottles, so that the mere touch of the dispenser will be enough to inform him when he is treading on dangerous ground, and be sure to inculcate caution, or to warn him of peril in the case of a mistake.

If the Tincture of Aconite is to be employed in medicine, it is a pity that so powerful a preparation should not be used of one uniform strength. Three tinctures are in use in this country; two are made according to the formulæ of the London and Dublin Colleges, and a third according to a process recommended by Dr. Fleming. These vary somewhat in strength; since to two pints of rectified spirit the London Pharmacopœia prescribes fifteen ounces of the dried root, Dr. Fleming sixteen

and two-thirds, and the Dublin Pharmacopœia twenty ounces. The largest dose commonly given is—of the London tincture, ten minims, (which is rather dangerous,) and of Dr. Fleming's, five minims. The tincture of the Paris codex is much weaker than any used in England—a fact which gave rise to the fatal prescription of twenty-five minims, which cost Mr. Brown his life.

My advice would be to discontinue altogether the use of Tincture of Aconite. It has been ascertained by Mr. Herapath that the amount of the active principle, Aconitina, varies from a quarter of a grain in an ounce of the fresh root to about three-quarters of a grain, from which it follows that the tincture, however carefully prepared, may be at least three times as strong at one time as it is at another. This, in my opinion, renders it altogether an unsafe preparation. I have therefore recommended the employment instead of a weak solution of the pure alkaloid, Aconitina, of one certain strength and known power, containing, for instance, one grain in ten drachms—i. e., $\frac{1}{800}$ in each minim of the solution. This might be given with advantage in all the cases in which the tincture of aconite has been recommended by Störck, Lombard, Fleming, and other physicians.

The second class of cases of Aconite-root poisoning includes those in which this root has been eaten by mistake as an article of food.

In nearly all the instances of this recorded during the last few years, the singular error has been committed of mistaking the root of *aconite* for that of the common *horseradish*, and thus scraping it and eating it along with our national dish, roast beef. I have before me brief notes of four instances of this calamitous mistake, which have occurred in this country during the last twenty years. The aconite being a plant so commonly grown in our gardens—one which possesses, to some extent, the dangerous property of spreading in the soil to a distance from the spot where it was first planted; having an annual stem, which dies away in the autumn, and a perennial

root of a notable size, which may be taken for horseradish by an unskilful person—all are circumstances which have combined to cause these accidents.

CASE 1.—(*Reported by Dr. Pereira.*)—On February 5th, 1837, Mr. Prescott, of the City-road, London, dug up in his garden some roots which he supposed to be those of horseradish. They were about the size of small walnuts, not so thick, but longer. They were washed, scraped, mixed with some vinegar, and served at dinner with roast beef. Three roots were used. About two-thirds were consumed by himself, his wife, and child of five years. Much the greatest part was eaten by Mr. Prescott, who remarked that the taste was unusually mild. Three-quarters of an hour after dinner he was seized with burning, followed by numbness, of the lips, mouth, and throat. Violent vomiting succeeded, then sweating. His eyes are described as “glaring.” (Does not this look as if the pupils must have been dilated? The fact is not mentioned, as the account was obtained from his wife.) His lips were blue. He trembled, but was not palsied, neither was he insensible. He was observed very frequently to put his hand to his throat. All treatment was vain; four hours after dinner he was dead. His wife, who had taken much less, was affected with similar symptoms, with the addition of slight general palsy. She recovered. The child also was but slightly affected. Both were observed to be frequently putting their hands to their throat.

CASE 2.—Similar to the last. Recorded very briefly in *The Times* of Nov. 4th, 1842. The patient died.

CASE 3.—The account was printed in the *Bristol Mercury*. It occurred on October 30th, 1853, to Mr. J. Russell, of Bristol. The same unfortunate mistake was here made by a servant girl. She thought the “horseradish” was very dead, and had no strength in it. Mr. Russell ate at dinner “just as much as would go on the point of a table-knife.” (Mr. Herapath has calculated that the quantity thus indicated could not have exceeded thirty-five grains in weight, or have contained more

than one-twentieth of a grain of pure aconitina.) The symptoms were just as usual. A deadness, described as spreading down one side, is the most remarkable of them; his pupils, too, were dilated. His pulse having gone, he died.

CASE 4.—The most recent, and perhaps the most remarkable case on our list is that sudden tragedy at Dingwall, in Ross-shire, the details of which must be fresh in all our memories. I will repeat them, with but little alteration, as they were given in *The Times* of January 28th, 1856.

On the evening of the Tuesday preceding, Provost M'Iver, of Dingwall, had a party to dinner, consisting of the Rev. J. Gordon, Roman-catholic priest at Beaully, Rev. Angus M'Kenzie, Roman-catholic priest at Eskdale, Mr. Lewis M'Kenzie, proprietor of the estate of Findon Black Isle, Mr. John M'Donald, of Torriden, the Provost himself, and the ladies members of his family.

After dinner, Mr. Gordon complained of a parched mouth, took a draught of water, and retired from the room. Mr. M'Donald also felt ill, complaining likewise of a parched and burning sensation in the mouth and throat; he also took a draught of water, and went out into the open air, walking about smartly, to drive off the affection. The other priest was then taken ill, next Mr. M'Kenzie of Findon, and lastly the Provost himself, the symptoms in all being the same. Medical attendance came quickly. The priests were found vomiting and suffering dreadfully. Nothing could relieve their agony. Shortly they died. (The symptoms, as collected piecemeal from various papers, seem all to have been those of aconite poisoning.) Mr. M'Kenzie of Findon sank next. The Provost and Mr. M'Donald, feeling sure that they had all taken some deadly poison, kept walking about briskly, and at length mastered their symptoms. (This exercise, however, they would not have been able to take, had they eaten as much of the poison as the other three.) The ladies were not even taken ill. A message having been sent to Edinburgh, to the Lord Advocate, the sheriff was quickly in attendance, bringing with him

Drs. Christison and McLagan. But long before this the mystery had been cleared up. Roast beef was the *pièce de resistance* at the table. It seems that horseradish is seldom eaten in Scotland. But, unhappily, on this occasion, the host was desirous of displaying at his table this English delicacy. The aconite grew in the garden, close to the horseradish. It was in the winter time, so that its leaves were not seen. The man-servant dug up one of its roots by mistake, and the cook used it both as garnishing and sauce for the roast beef. The Provost, who carved, ate but sparingly : he was the last to be taken ill, and he eventually recovered. The other gentlemen were helped in turn, and were afterwards seized with the fatal symptoms in the order in which they had been helped. The ladies partook of mutton, and so escaped.

What renders these accidents the more remarkable is, that there is really very little resemblance between the root of horseradish and that of aconite, as may be seen by comparing them. *Horseradish root*—long, fusiform, simple, gradually tapering, with a light-yellow epidermis,—internally white, tough, of a peculiar pungent taste, not changing colour on exposure until dry. *Aconite root*—tap-shaped, usually swollen or napiform above, tapering abruptly, giving off many fibres, having a darkish-brown epidermis,—white within, more spongy, softer, and not so tough as horseradish, the scrapings tending to a pinkish colour when exposed for some time; the taste somewhat acrid, but not to be called pungent. The root, when one or two years old, is simple; when older, offshoots spring from the sides; these becoming developed, the root at length presents a clustered or fasciculate appearance.

I conceive that it is only the simple or annual root with which such a mistake could be made. The root also is dug up in winter, when horseradish is in season, and the leaves of both have died down. Few would make a mistake between the growing monkshood and the great dock-like leaves of the horseradish in summer.

To the cases just related, I may add a short account of an-

other which occurred some time ago in my own experience—an example of poisoning by aconite root, which fortunately did not prove fatal.

CASE 5.—A gentleman of my acquaintance being at breakfast one morning with his brother, both partook of coffee. (It was afterwards remembered that the coffee-strainer, which had not been used for some time, had been formerly employed in a chemical laboratory to strain some decoction of aconite roots; it had been washed and put aside, but not burned, as it should have been.) My friend tells me, that shortly after breakfast he set out as usual on an accustomed walk, but had not proceeded far when he noticed a peculiar tingling sensation about his tongue, which shortly extended backwards into the throat. His tongue felt too large for his mouth; his lips and face tingled; and soon a creeping sensation extended down both arms, and next along the thighs also. He then felt altogether ill, with giddiness in the head, swimming before the eyes, great weakness, and almost inability to stand. He noticed a peculiar feeling of stiffness about the neck and back, a symptom which out-lasting all the others. His head felt as if it was in a vice, and yet so heavy that he thought he could hardly support it; he felt continually as if he wanted to draw a deep breath; he did so with much effort, but with relief to the giddiness. He was not sick. After a time his symptoms gradually abated. His case is interesting,—as we have here, given by an intelligent and competent person, the very characteristic train of symptoms caused by an over-dose of aconite. The brother was affected very much in the same manner, but lay down on the sofa, expressing himself as unable to stir a limb. He, too, got over it. The coffee-strainer was burnt; but my friend, who had previously suffered from dyspepsia and aggravated hypochondriasis, assures me that for some weeks after this occurrence he was in better health and spirits than he had ever been before.

I regret that I am obliged to curtail the remarks which I had intended to make on these cases of poisoning. We are

already aware that the action of Aconite depends upon the presence in it of a very powerful agent, the alkaloid Aconitina. This is not possessed of any very characteristic chemical properties, but its medicinal properties are marked enough. A solution applied to the skin causes numbness. One-tenth of a grain taken into the stomach would certainly kill a man. It is by far the most powerful of all known poisons. It is of use in medicine chiefly as an external agent in the treatment of neuralgia, the pain of which it rapidly relieves. I busied myself, some years ago, in discovering a good and economical mode of obtaining this alkaloid, and succeeded in inventing one which has proved successful in the hands of all who have since tried it. By this process, Mr. Herapath finds that dried aconite root grown in England contains from twelve to thirty-six grains of aconitina in one pound. The smaller amount is yielded by roots collected at the commencement of the season, and containing a large proportion of starch. Those dug up after flowering are of lower specific gravity, and contain most aconitina by weight. In the root of *Aconitum ferox*, imported from India, (this is the *Bikh* of the Hindoos, a terrible poison,) I have found that there is, on the average, about three times as much as in the English root—that is, fifty-five grains in one pound of the heavy roots; ninety grains in one pound of those gathered late in the season.

There are two ways in which we may with great certainty recognise a case of Aconite poisoning—

1. By noting the symptoms.
2. By chemical means.

1. The symptoms are very characteristic. The tingling and numbness, spreading from the tongue and mouth; the uneasiness in the neck; the giddiness, followed by vomiting; the palsy of the limbs, followed by failure of the pulse and the breathing; the absence of coma as a marked symptom,—all characterize Aconitina,—a poison which is a general sedative to the nervous system, acting first on the nerves of common sensation; then on the cerebrum; thirdly, on the vagus nerve, as

supplied to the stomach; fourthly, on the same nerve, as connected with the heart and lungs, and, at the same time, on the system of motor nerves. The particulars of the action of aconitina on various animals I have elsewhere enumerated.*

I may notice that many discrepant statements have been made as to the action of Aconite. Boerhaave uses the words, "*vim pessimam causticam et suffocantem habet.*" I agree to the second term, but not to the first. Haller and Störck, who both attribute acridity to the plant, probably described a variety of *A. paniculatum*, and *A. Lycoctonum*, both of which grow in central Europe, and are more acrid than our native species. It is curious that *A. paniculatum*, when growing in Scotland, has been found to be nearly inert; and the shoots of *A. Lycoctonum*, poisonous in Switzerland, are in Sweden eaten with salad.

Dr. Christison states that hemlock causes death by paralyzing the muscles, and so arresting the respiration; but that aconite has no action on the muscular system. Yet it certainly produces palsy, though only as a secondary effect.

Dr. Pereira and others state that it contracts the pupil, like opium. To this, my own observations of its effects upon animals are directly opposed. I find that it dilates the pupil, in the same manner, though not in the same degree, as belladonna. Geiger, Hesse, Herapath, and others, make the same statement. Perhaps the effect on the pupil may vary somewhat, and it is also possible that it may act differently upon man and animals. It is certain that in animals it commonly produces delirium or convulsions, as also salivation, all of which are rare in the human subject. On this subject of the state of the pupil further observations seem to be required.

The first proof of Aconite poisoning is derived from the symptoms; the second proof is a chemical one. Although there are no distinct chemical tests by which we can recognise Aconitina, it would be comparatively easy, in cases of poisoning, to obtain from the contents of the stomach and the matter vomited some

* "Essay on the Action of Medicines."

portion of the poisonous principle. My ether-process for obtaining Aconitina might be modified for this purpose; or the principle obtained by boiling spirit upon the extract left on evaporating a clear acid solution of the contents of the stomach; or the animal-charcoal process pursued, by which Dr. Taylor could extract half a grain of strychnia from a gallon of beer. The alkaloid, or the spirituous extract, should then be tried upon animals. If $\frac{1}{20}$ th of a grain be obtained, it will be enough. $\frac{1}{300}$ th of a grain will poison a mouse, with characteristic symptoms; $\frac{1}{100}$ th, a small bird. $\frac{1}{1000}$ th of a grain causes tingling and numbness of the tip of the tongue; $\frac{1}{100}$ th, dissolved in spirit and rubbed into the skin, causes loss of feeling, lasting for some time. By these means, which are as sure in their way as chemical tests, we may determine the presence of aconitina, and corroborate the evidence derived from our remarks upon the symptoms.

Treatment.—I must here content myself with making a few suggestions of a practical nature. As soon as the poisoning is suspected, a large quantity of animal charcoal should be given. Upon this plan of treatment I am inclined to lay great stress, as I find that aconitina is quickly taken up, and obstinately retained by this agent. A zinc emetic may follow. It will cause the evacuation of the charcoal, and of the poisonous principle along with it. If given first, it does harm, by assisting absorption. Brandy and ammonia should then be freely administered, and, if we have rendered help in time, the patient may perhaps be saved.
